Advances in Aircraft Structures

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The Reciprocity Gap Method

Syed Muhammad Kashif

Abstract

This chapter discusses reciprocity gap method that makes use of full filed data. In this method, full field displacement data is measured at the specimen boundary. For the case of static loading, displacement-force boundary data is measured and using principle of virtual work, a reciprocity gap functional is reconstructed to give the interior and within the specimen distribution of the elastic tensor. This method has also been applied to the case of finding plate's flexure rigidities. However, the technique has shown good results for the crack identification problems.

***Keywords**: Reciprocity gap method, full field data, inverse methods, crack identification*

1. Introduction

The reciprocity gap method (RGM) is proposed for the identification of unknown distribution of elastic moduli using full-field measurements. It assumes that the displacement distribution on the boundary, induced by a known applied static load, is measurable in the form of full-field data. Let $(\xi, \square)$ denote the known displacements and tractions on the boundary $\partial\Omega$ of an elastic body in domain Ω. From such displacement-force boundary data, the interior distribution of the